

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (currently amended): A high strength steel sheet excellent in formability, resistant to delayed fracture and compatible with chemical converted conversion coating treatment~~[[,]] and hot-dip galvanizing, and resistant to delayed fracture, characterized in that:~~ said steel sheet consisting essentially of, in mass,

0.03 to 0.20% C,

0.107 to 0.3% Si,

1.0 to 3.1% Mn,

0.001 to 0.06% P,

0.001 to 0.01% S,

0.0005 to 0.01% N,

0.2 to 1.2% Al,

and not more than 0.5% Mo,

with the balance consisting of Fe and unavoidable impurities; the amounts of Si and Al in mass % and the target strength (TS) of said steel sheet satisfy the following expression (1); and the metallographic structure of said steel sheet contains ferrite and martensite without containing retained austenite and has a tensile strength of 980 MPa or more and a value of TS x E1 of 16,000 or more;

$$(0.0012 \times [\text{target strength TS}] - 0.29 - [\text{Si}])/2.45 < \text{Al} < 1.5 - 3 \times [\text{Si}] \dots (1)$$

where, [target strength TS] is the designed strength of said steel sheet in terms of MPa and [Si] is the amount of Si in terms of mass %.

2 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot-dip galvanizing according to claim 1, characterized by~~

further consisting essentially of at least one of, in mass, 0.01 to 0.1% V, 0.01 to 0.1% Ti, and 0.005 to 0.05% Nb.

3 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 1 or 2, ~~characterized by~~ further consisting essentially of 0.0005 to 0.002 mass % B; and satisfying the following expression (2),

$$500 \times [B] + [Mn] + 0.2[Al] < 2.9 \dots (2)$$

where, [B] is the amount of B, [Mn] that of Mn, and [Al] that of Al, each in terms of mass %.

4 (currently amended): A high strength steel sheet excellent in formability, ~~chemical converted treatment and hot dip galvanizing~~ according to claim 1 or 2, ~~characterized by~~ further consisting essentially of, in mass, one or both of 0.0005 to 0.005% Ca and 0.0005 to 0.005% REM.

Claim 5: (canceled).

6 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 1 or 2, ~~characterized in that~~ wherein said steel sheet is a hot-rolled steel sheet or a cold-rolled steel sheet.

7 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 1 or 2, ~~characterized in that~~ wherein hot-dip galvanizing treatment is applied to said steel sheet.

8 (withdrawn – presently amended): A method for producing a high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 1, ~~characterized in that~~ wherein said steel sheet is produced through the processes of: hot rolling at a finishing temperature of the Ar₃ transformation temperature or higher; coiling at 400°C to 550°C; successively applying ordinary pickling; thereafter primary cold rolling at a reduction ratio of 30 to 70%; then recrystallization annealing in a continuous annealing process; and successively skin-pass rolling.

9 (withdrawn – presently amended): A method for producing a high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 8, ~~characterized in that~~ wherein, in said annealing process, said steel sheet is: heated to a temperature in the range from the Ac_1 transformation temperature to the Ac_3 transformation temperature + 100°C; retained for 30 sec. to 30 min.; and thereafter cooled to a temperature range of 600°C or lower at a cooling rate of not less than X °C/sec., X satisfying the following expression (3), $X \geq (Ac_3 - 500)/10^a$ (3)

$$a = 0.6[C] + 1.4[Mn] + 3.7[Mo] - 0.87,$$

where, X is a cooling rate in terms of °C/sec., Ac_3 is expressed in terms of °C, $[C]$ is the amount of C, $[Mn]$ that of Mn, and $[Mo]$ that of Mo, each in terms of mass %.

10 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 3, ~~characterized by~~ further consisting essentially of, in mass, one or both of 0.0005 to 0.005% Ca and 0.0005 to 0.005% REM.

11 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 3, ~~characterized in that~~ wherein said steel sheet is a hot-rolled steel sheet or a cold-rolled steel sheet.

12 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 4, ~~characterized in that~~ wherein said steel sheet is a hot-rolled steel sheet or a cold-rolled steel sheet.

13 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 3, ~~characterized in that~~ wherein hot-dip galvanizing treatment is applied to said steel sheet.

14 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot dip galvanizing~~ according to claim 4, ~~characterized in that~~ wherein hot-dip galvanizing treatment is applied to said steel sheet.

15 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot-dip galvanizing~~ according to claim 6, ~~characterized in that wherein~~ hot-dip galvanizing treatment is applied to said steel sheet.

16 (new): A high strength steel sheet according to claim 1, wherein the steel sheet contains Mn in an amount from 2.02% to 3.1%.

17 (new): A high strength steel sheet according to claim 1, wherein the steel sheet does not contain any one of Nb, V, B and Ti.

18 (new): A high strength steel sheet excellent in formability, resistant to delayed fracture and compatible with chemical conversion coating treatment and hot-dip galvanizing, said steel sheet consisting of, in mass,

0.03 to 0.20% C,
0.107 to 0.3% Si,
1.0 to 3.1% Mn,
0.001 to 0.06% P,
0.001 to 0.01% S,
0.0005 to 0.01% N,
0.2 to 1.2% Al,
and not more than 0.5% Mo,
at least one of 0.01 to 0.1% Ti, 0.005 to 0.05 Nb, and 0.01 to 0.1% V;

with the balance consisting of Fe and unavoidable impurities; the amounts of Si and Al in mass % and the target strength (TS) of said steel sheet satisfy the following expression (1); and the metallographic structure of said steel sheet contains ferrite and martensite without containing retained austenite and has a tensile strength of 980 MPa or more and a value of TS x E1 of 16,000 or more;

$$(0.0012 \times [\text{target strength TS}] - 0.29 - [\text{Si}])/2.45 < \text{Al} < 1.5 - 3 \times [\text{Si}] \dots (1)$$

where, [target strength TS] is the designed strength of said steel sheet in terms of MPa and [Si] is the amount of Si in terms of mass %.